

NON-PUBLIC?: N
ACCESSION #: 8711240150
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Nine Mile Point Unit 2 PAGE: 1 of 5

DOCKET NUMBER: 05000410

TITLE: Turbine Trip and Reactor Scram on Low Condenser Vacuum due to Improper Tagging

EVENT DATE: 10/23/87 LER #: 87-064-00 REPORT DATE: 11/20/87

OPERATING MODE: 1 POWER LEVEL: 036

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: Robert G. Randall, Supervisor Technical Support

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SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT: On October 23, 1987 at 1142 hours the turbine tripped on low condenser vacuum, resulting in a reactor scram from 36% power. A feedwater pump was tagged out of service for seal repair work, but two manual valves in the minimum flow line were inadvertently omitted from the markup. Due to an improper review of this markup, the control room operator gave permission for a relay to be removed for troubleshooting in the minimum flow valve control circuit. Removal of the relay caused the valve to fail open, providing a path for air inleakage through the pump body to the condenser. The low condenser vacuum instrumentation initiated a turbine trip, which subsequently led to a reactor scram. The root cause of the event is cognitive personnel error.

Immediate corrective actions were to reset the scram at 1206 hours, to follow the scram recovery procedure for safe shutdown of the plant, and to investigate the cause for the low vacuum. Further corrective actions taken were counseling for the individual responsible for reviewing the markup, issuance of a memo to Operations personnel from the Operations Superintendent emphasizing attention to detail, and further training for operators via continued training and the Lessons Learned program.

(End of Abstract)

TEXT: PAGE: 2 of 5

I. DESCRIPTION OF EVENT

On October 23, 1987 at 1142 hours, the reactor scrambled from approximately 36% power as a result of a turbine trip on low condenser vacuum. The following conditions existed prior to the event:

1. Feedwater Pump A (P1A) was tagged out of service for seal repair work and its seals were removed. Feedwater Pump B was operating with its feed flow control valve in manual, and Feedwater Pump C was operating with its feed flow control valve in automatic.
2. With the permission of the NMPC licensed control room operator, an NMPC electrician and another licensed operator were troubleshooting a relay in the P1A minimum flow control valve (FV2A) control circuit.

The feedwater pump minimum flow lines run from each pump discharge directly to the condenser. Each line contains a minimum flow control valve, a manual blocking valve and a manual bypass valve.

Due to inadvertent oversight, the manual blocking and bypass valves upstream of FV2A had not been tagged out of service as they should have been for the seal repair work. The licensed control room operator controlling the markup (i.e. tag out) did not properly review the existing markup prior to granting permission for the relay to be removed. Subsequently, when the relay was removed from the circuit, FV2A failed open as expected. Since the manual blocking and bypass valves in the line were not tagged closed, this provided a path for air inleakage through the pump body to the condenser.

At approximately 1138 hours the relay was removed, FV2A failed open and the offgas system inlet pressure began increasing with system flow indicating upscale on both flow indicators in the control room. Condenser vacuum began decreasing. As low vacuum alarms were received, the licensed control room operator attempted to reduce power by inserting control rods to preserve vacuum. However, only two control rods were inserted before condenser vacuum reached the low vacuum setpoint at 1142 hours, resulting in a turbine trip and reactor scram. Reactor water level decreased to approximately 140 inches, as expected, actuating all applicable Level 3 signals (i.e. low reactor water level). Subsequently, level began rising and feedwater Pump C was manually secured. However, level continued rising to approximately 207 inches, actuating all applicable Level 8 signals. As a result of the high reactor water level signals (i.e. Level 8), feedwater Pump B auto tripped as designed to prevent reactor overfill.

Immediate corrective actions were to reset the scram at approximately 1206 hours, to follow the scram recovery procedure for safe shutdown of the plant and to investigate the cause for the low vacuum alarms.

Subsequent analysis revealed that the operator inserted the two rods out of sequence. This error occurred when the operator incorrectly selected one of two volumes of the control rod sequence book available at the Reactor Manual Control panel. No flux shaping problems occurred as a result of this error.

TEXT: PAGE: 3 of 5

II. CAUSE OF EVENT

A review of the feedwater pump markup indicated the immediate cause for the low condenser vacuum path was air inleakage through the marked up feedwater pump and the open manual blocking and bypass valves in the minimum flow line due to improper tagging.

The root cause of this event is cognitive personnel error. The manual blocking and bypass valves upstream of FV2A should have been tagged out for the seal repair work. The feedpump was originally tagged out on October 12, 1987 to protect the equipment from damage due to excessive leakage from the seals. On October 13, 1987 maintenance personnel began seal repair work and under this markup. However, the licensed control room operators and maintenance personnel performing the work should have reviewed the existing markup to ensure it adequately covered the scope of work prior to commencing maintenance. In addition, the licensed control room operator controlling the markup on October 23, 1987 did not properly review the markup prior to granting permission for the relay to be removed in the FV2A control circuit. Thus, improper tagging and inadequate review of the markup for maintenance and relay troubleshooting activities led to the turbine trip on low condenser vacuum and subsequent reactor scram.

The cause for the operator using the wrong control rod sequence book is insufficient administrative control.

III. ANALYSIS OF EVENT

There were no adverse safety consequences as a result of this event. The turbine trip system and Reactor Protection System (RPS) functioned as designed. A low vacuum in the condenser trips the turbine to protect against high turbine exhaust pressure which could damage the turbine and condenser. The turbine control valves and stop valves fast

close on a turbine trip signal, generating a reactor scram signal via RPS if reactor power is above 30%. A scram signal is generated under these conditions to protect the reactor from an overpressure transient that can lead to significant addition of positive reactivity to the core.

Using the wrong sequence book during this event did not jeopardize plant safety at any time. The reactor scrammed before a significant number of rods could be inserted. In addition, the Rod Sequence Control System (RSCS) and Rod Worth Minimizer (RWM) would have activated to prevent inserting rods out of sequence below 20% power. Thus, RSCS and RWM would have prevented a reactivity excursion.

However, at higher power levels the potential for fuel damage is greater due to rod mispositioning events. Therefore, it is recognized that administrative controls are essential to preclude such occurrences.

TEXT: PAGE: 4 of 5

IV. CORRECTIVE ACTIONS

Immediate corrective actions were to reset the scram at approximately 1206 hours, to follow the scram recovery procedure to safely shutdown the plant and to investigate the cause for the low condenser vacuum alarms. Further corrective actions are as follows:

1. The individuals responsible for reviewing the markup prior to performing seal maintenance and relay troubleshooting activities were counseled on the importance of adequately reviewing markups and giving attention to detail.
2. A memo was issued by the Operations Superintendent to all Operations personnel addressing this event and other events involving personnel error as well as corrective actions to prevent recurrence of these events.
3. Administrative controls have been implemented by the Reactor Analyst Department to ensure operators have instructions for getting control rods back into sequence. In addition, both volumes of the control sequence book were incorporated into one volume to eliminate confusion.
4. The Operations Superintendent issued a memo to all license holders evaluating this event and providing corrective actions that will prevent future rod mispositioning.

5. Details of this event have been included in the Reactor Analyst Department Lessons Learned Book and will be included in the Operations Department Lessons Learned Book for review by all Operations and Reactor Analyst personnel.

6. Training Modification Recommendation (TMR) 02-87.251 has been initiated to discuss this LER with Operations personnel in continued training. Additional TMRs (E-87-158 and M-87-87) have been initiated to train maintenance personnel to adequately review markups prior to commencing maintenance activities.

TEXT: PAGE: 5 of 5

V. ADDITIONAL INFORMATION

A. Identification of Components Referred to in this LER

IEEE 803 IEEE 805

Component EIIS Funct System ID

Turbine TRB N/A

Condenser COND N/A

Reactor RCT N/A

Reactor Protection System (RPS) N/A JC

Feedwater System (FWS) N/A SJ

Offgas System (OFG) N/A SH

Flow Control Valve FCV SJ

Flow Indicators FI SH

Relay RLY SJ

Turbine Trip System (ETS) N/A JJ

Feedwater Pump Trip System N/A JK

Reactor Manual Control System (RMCS) N/A N/A

Rod Sequence Control System (RSCS) N/A JD

Rod Worth Minimizer (RWM) N/A JD

B. Previous Similar Events - LER 87-02 describes an Engineered Safety Feature (ESF) actuation caused by approval and implementation of a markup without adequate review of plant status. This event is similar to the LER 87-02 event in that both address improper review of markups by control room operators. Evaluation of the markup system and previous corrective actions indicates that the system has been effective in protecting plant personnel and equipment.

C. Failed Components - None

NMP29801

NIAGARA MOHAWK POWER CORPORATION

NIAGARA MOHAWK

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SYRACUSE, NY 13212
THOMAS E. LEMPGES
VICE PRESIDENT -- NUCLEAR GENERATION

November 20, 1987

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

RE: Docket No. 50-410
LER 87-64

Gentlemen:

In accordance with 10 CFR 50.73, we hereby submit the following Licensee Event Report:

LER 87-64 Is being submitted in accordance with 10 CFR 50.73 (a)(2)(iv), "Any event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature (ESF), including the Reactor Protection System (RPS). However, actuation of an ESF, including the RPS, that resulted from and was part of the preplanned sequence during testing or reactor operation need not be reported."

A 10 CFR 50.72 (b) (2) (ii) report was made at 1210 hours on October 23, 1987.

This report was completed in the format designated in NUREG-1022, Supplement 2, dated September 1985.

Very truly yours,

/s/ Thomas E. Lempges
Thomas E. Lempges
Vice President

Nuclear Generation

TEL/PB/mjd

Attachments

cc: Regional Administrator, Region 1
Sr. Resident Inspector, W. A. Cook

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